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[54] **DEVELOPER FOR IMAGE PRODUCING APPARATUS UTILIZING ELECTROPHOTOGRAPHIC DEVELOPING TECHNOLOGY**

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[51] **Int. Cl.**[7] **G03G 15/08**

[52] **U.S. Cl.** **399/281**; 399/285

[58] **Field of Search** 399/279, 281, 399/283, 285

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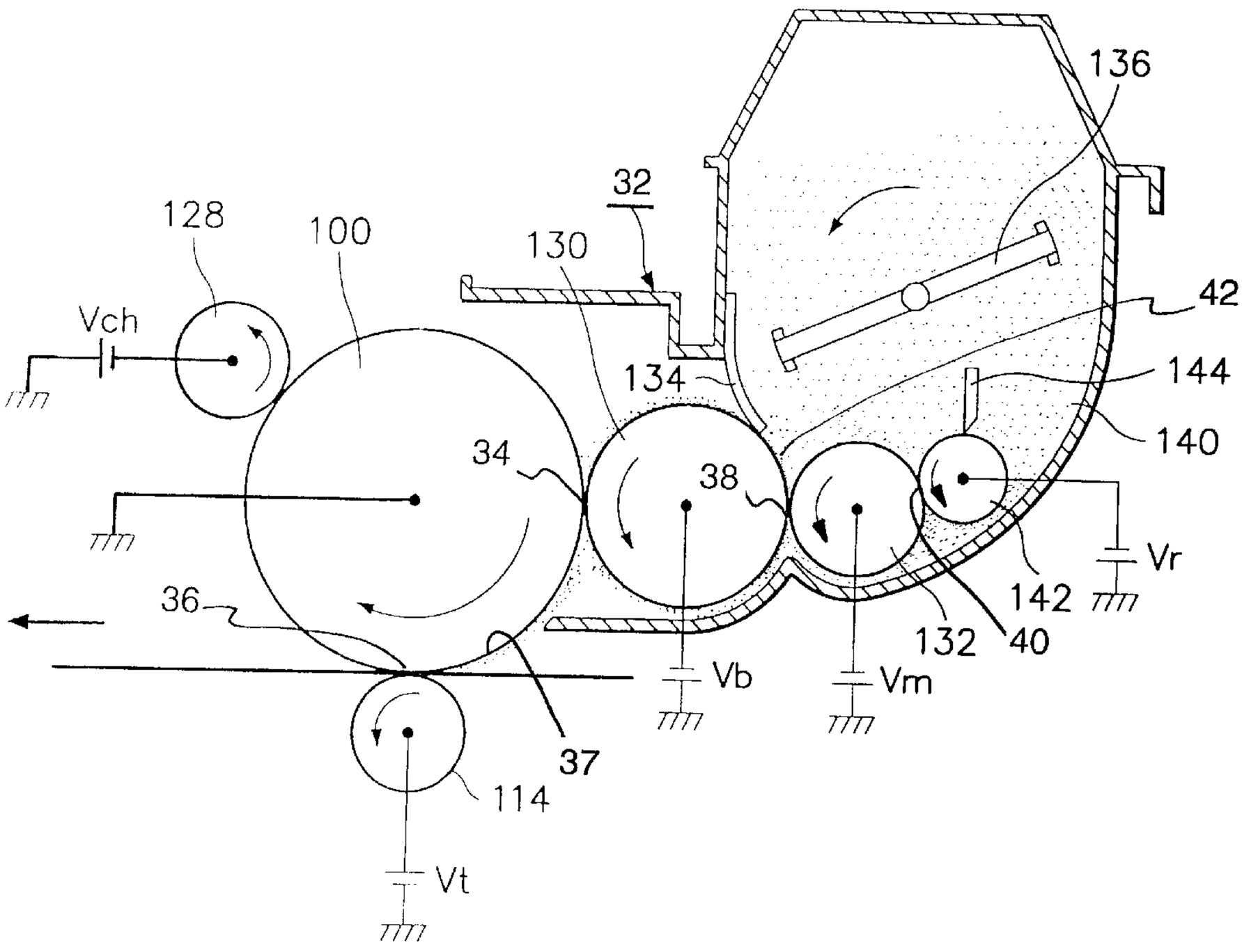
[57] **ABSTRACT**

A developer and development process for use in an image formation apparatus employing electrophotographic developing technology. In the developer, a reset roll may be positioned around the toner feeding roll so as to come into contact with a toner feeding roll, thus getting the remaining toner from the surface of the toner feeding roll so as to clean the toner feeding roll. A cleaning blade is positioned with its edge coming into contact with the surface of the reset roll, thus removing the remaining toner from the reset roll. The developer almost completely prevents any deterioration of expected operational function of a toner feeding roll even when the developer is used for a lengthy period of time, thereby effectively preventing any reduction in the image quality of processed papers due to such a deterioration of the toner feeding roll's operational function.

21 Claims, 3 Drawing Sheets



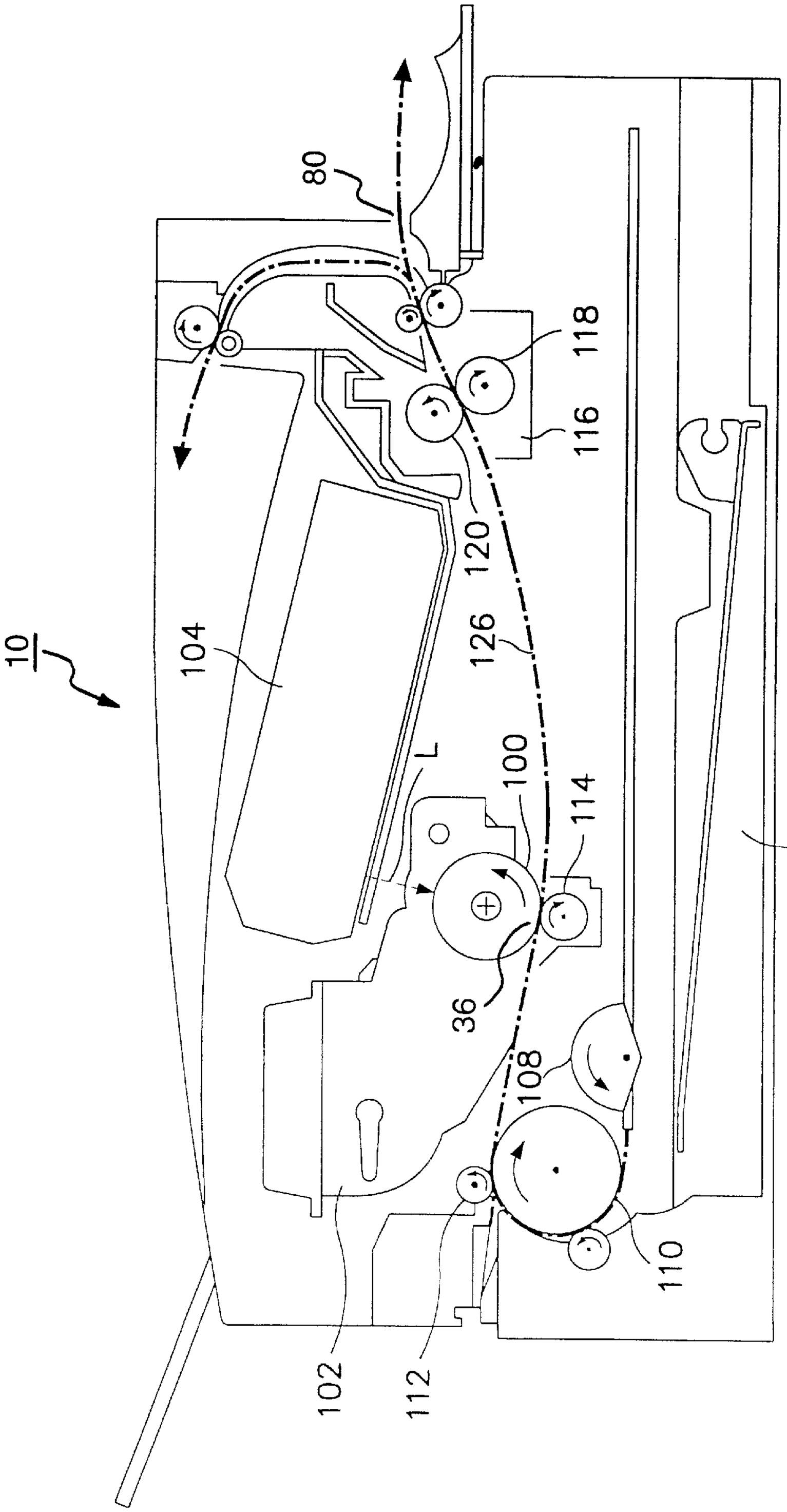


FIG. 1

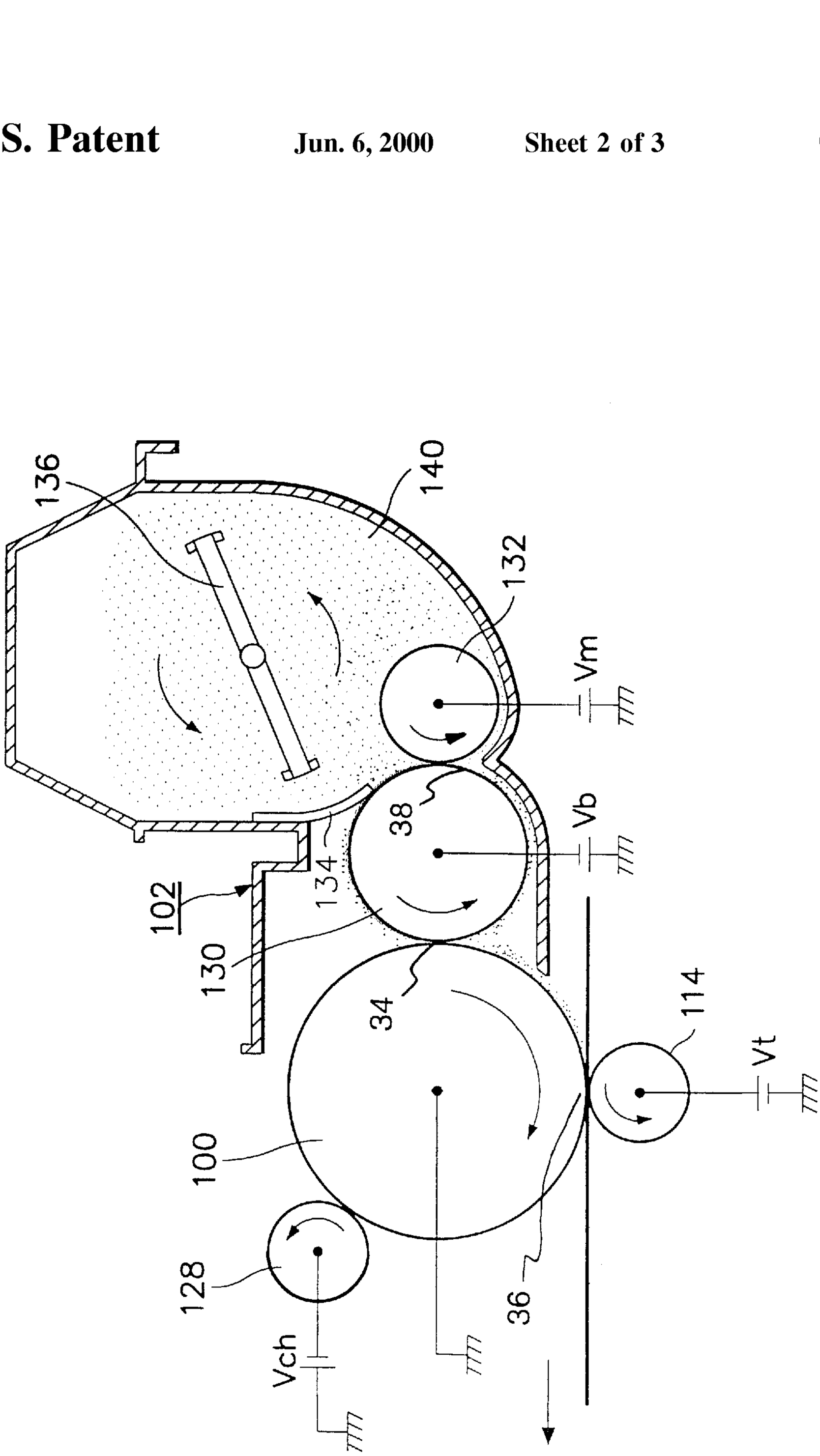
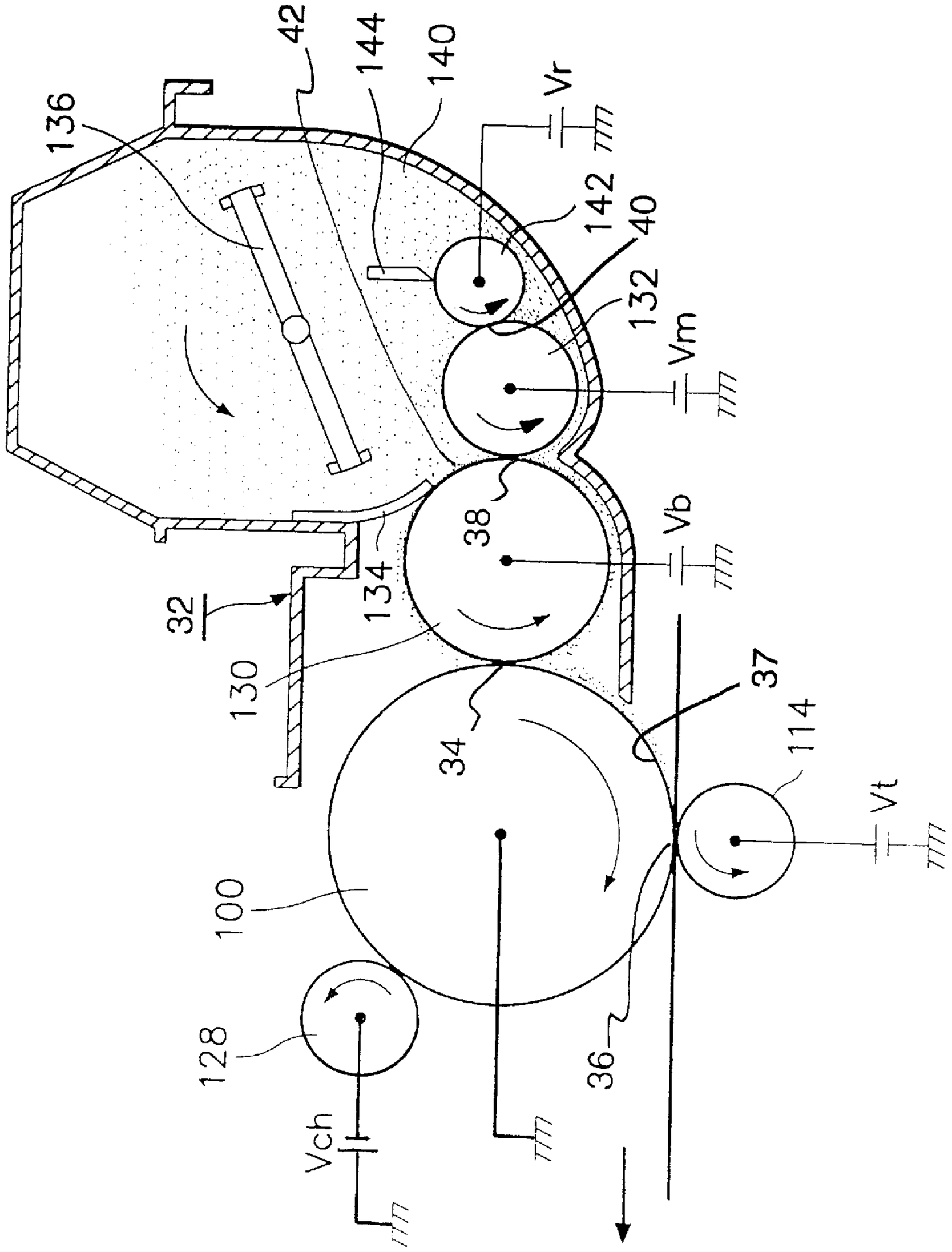


FIG. 2


136
42
144
140
Vr
142
40
132
Vm
38
Vb
32
134
130
34
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114
Vt
100
128
Vch
36

FIG. 3

DEVELOPER FOR IMAGE PRODUCING APPARATUS UTILIZING ELECTROPHOTOGRAPHIC DEVELOPING TECHNOLOGY

CLAIM FOR PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under Title 35 U.S.C. §119 from my earlier filing of a patent application entitled Developer For Image Producing Apparatus Utilizing electrophotographic Developing Technology in the Korean Industrial Property Office on the 14th day of Mar. 1997, and there duly assigned Ser. No. 1997/8618.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to image formation processes and apparatus using electrophotographic developing technology and, more particularly, to a developer preferably used in such processes and apparatus while using contact-type, single component and non-magnetic developing technology capable of developing an image by applying non-magnetic toner onto an electrostatic latent image that has been formed on the exterior circumferential surface of a photosensitive drum.

2. Description of the Prior Art

As well known to those skilled in the art, electrophotographic developing technology has been effectively and widely used in various picture producing apparatus, such as copying machines, laser beam printers, and plain paper facsimiles for converting optical image signals bearing data corresponding to images onto a tangible medium such as a cut sheet of paper. These images are processed with electrophotographic developing technology by a sequence of electrification, exposure, development, transcription and fixation on the printed medium. The engine mechanism of a typical example of a picture producing apparatus using an electrophotographic developing technique includes a photosensitive drum, a developer and a transfer roll. The developer usually has an electrifying roll, a developing roll, a toner feeding roll, a toner regulating blade and a toner agitator.

The agitator is installed in the toner tank of the developer and agitates new and remaining toner at a position around both the developing and feeding rolls, thus effectively mixing the new toner and the remaining toner together. The toner, applied on the developing roll, is regulated by the toner regulating blade. Toner on the developing roll is moved and attached to the exposure area of the photosensitive drum due to static electricity formed by a potential difference between the exposing potential of the drum and the developing potential of the roll, thus developing an image.

During the operation of the printer, the toner on the developing roll is partially moved onto the photosensitive drum. The toner on the developing roll is partially used at every revolution of the roll while the remaining toner kept on the roll remains unused. The developer is designed to remove the remaining toner from the developing roll by the rotation of a toner feeding roll at the nip between the two rolls after every revolution of the developing roll. When a developer is used for a lengthy period of time, however the expected operational function of the toner feeding roll may be deteriorated due to frictional abrasion of the roll's surface or an infiltration of the sponge used to make the roll's circumferential surface. In such a case, the toner feeding roller may fail to effectively remove such remaining toner from the developing roll, allowing the remaining toner to be

frictionally electrified again at the nip between the developing roll and the feeding roll prior to being reused in a continued development step. Therefore, the frictional electrification of the developer for the toner may be reduced and fail to allow uniform distribution of the electrified bias voltage for each part of the developer, thereby reducing the quality of images printed upon each sheet of paper. Various schemes have been advocated in the art such as the Fixing Device Having A Cleaning Blade of Takayuki Seki, U.S. Pat. No. 5,625,442; the Cleaning Device For An Image Forming Apparatus of Motoharu Miki et alii, U.S. Pat. No. 5,678,134; the Image Forming Apparatus Employing Residual Toner Recovery Scheme of Yasuo Takuma, U.S. Pat. No. 5,701,570; and the Developing Device For An Image Forming Apparatus of Toshihiro Sugiyama, et alii, U.S. Pat. No. 5,708,942. Invariably, these schemes require modification, albeit however minor, of the operational sequence of the developer, and tend to lack backward compatibility enabling use of the developer, with a pre-existing image formation apparatus.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved image formation apparatus and process.

It is another object to provide an apparatus and process for retarding deterioration of the expected operational function of the toner feeding roller in the developer of an image formation apparatus even after the developer has used for a lengthy period of time.

It is still another object to provide an apparatus and process able to effectively minimize reduction in the quality of successive images printed by an image formation apparatus during the process onto paper by minimizing deterioration of the operational function of the toner feeding roller.

It is yet another object to provide an apparatus and process that assures backward compatibility between a currently existing image formation apparatus and a developer able to retard deterioration of the expected operational functions of the toner feeding roller in the developer even after the developer has been used for a lengthy period of time.

It is also an object to provide a developer and development process for a picture producing apparatus utilizing an electrophotographic developing technology, which almost completely prevents any deterioration of expected operational function of a toner feeding roller even when the developer is used for a lengthy period of time, thus effectively preventing any reduction in the image quality of processed papers due to such a deterioration of the toner feeding roller's operational function.

In order to accomplish the above object, the present invention provides a process and developer for image producing apparatus utilizing an electrophotographic developing technology. The process may be performed with a developer constructed with, inter alia, a reset roller positioned around the toner feeding roller so as to be brought into contact along a nip formed with the toner feeding roller, thus receiving the residual toner from the surface of the toner feeding roller so as to clean the toner feeding roller, and a cleaning blade positioned with an edge coming into contact with the surface of the reset roller to remove the remaining toner from the reset roller.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of this invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

FIG. **1** is a view showing the construction of an engine mechanism of a typical laser beam printer as an example of an image formation apparatus that uses electrophotographic developing technology, suitable for the practice of the instant invention;

FIG. **2** is a cross-sectional schematic view showing the construction of a typical developer that may be included within the image formation apparatus illustrated by FIG. **1**, with indications of the application of bias voltages for the several parts of the developer; and

FIG. **3** is a cross-sectional schematic view illustrating the construction of a developer for the practice of the principles of the present invention while using an image producing apparatus such as that illustrated by FIG. **1** in accordance with the principles of the present invention, and illustrating the application of bias voltages for the several parts of the developer.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, FIG. **1** schematically shows the construction of an engine mechanism of a typical laser beam printer (LBP) **10** that is used in this description as an apt example of one type of picture producing apparatus that uses electrophotographic developing technology, while FIG. **2** shows both the construction of a developer frequently included within a laser beam printer of the type shown by FIG. **1**. The electrification of bias voltages for the several parts of the developer are also shown in FIG. **2**. As shown in these drawings, the laser beam printer includes a photosensitive drum **100**, a developer **102** and a transfer roller **114**. The developer **102** may be constructed with an electrifying roller **128**, a developing roller **130**, a toner feeding roller **132**, a toner regulating blade **134** and a toner agitator **136**, as may be best seen in FIG. **2**. During the course of a printing operation by such a laser beam printer, photosensitive drum **100**, the rollers **114**, **128**, **130**, **132**, and agitator **136** typically receive rotation force from a drive motor through a power transmission mechanism (not shown), and are thus rotated clockwise or counterclockwise, as shown by the arcuate arrows in FIG. **2**, during the course of performing the printing process. During the printing operation, individual cut sheets of paper are orderly fed serratim from a paper cassette **106** to follow a passage **126** while passing along a path of conveyance through the image formation apparatus prior to being finally discharged from the laser beam printer through a paper outlet **80**.

In the above operation of the laser beam printer, the developer **102** performs an electrophotographic developing process as follows. As is described in the foregoing paragraphs, such an electrophotographic developing process is carried out in the order of electrification, exposure, development, transcription and fixation. In the electrification step, the photosensitive drum **100** is electrified with a negative bias voltage Vch, for example, about −1.4 kV, by the electrifying roller **128**, thus uniformly having negative electric potential of about −800 V on its surface. The electrified surface of the drum **100** is, thereafter, subjected to an exposure step as the drum **100** is rotated. That is, the electrified surface of the drum **100** is exposed to a laser scanner unit (LSU) **104** in accordance with image data, thus forming an electrostatic latent image thereon. In such a case, unexposed areas on the drum's surface maintain a negative electric potential (−800 V) without any change, thus forming image-free areas. Meanwhile, the electric potential of exposed areas on the drum's surface is reduced from −800 V to a less negative voltage of several tens of volts. The exposed areas of the drum's surface, with the electrostatic latent image, reaches a developing area **34** due to the rotation of the drum **100**. The developing area **34** means the

nip between the photosensitive drum **100** and the developing roller **130** at which the development step is performed.

Within developing area **34**, the electrostatic latent image on the drum's surface is developed. That is, the latent image of the drum **100** is developed by toner carried by developing roller **130**, thus changing the electrostatic latent image into a visual image borne on the exterior circumferential. At a position around the developing roller **130**, the toner feeding roller **132** is installed so as to be brought into contact with the developing roller **130**. The toner feeding roller **132** frictionally electrifies toner from toner tank **140** of developer **102** and uniformly applies the toner onto the exterior circumferential surface of the developing roller **130**. The toner feeding roller **132** also gets remaining toner on its surface from the developing roller **130** at every revolution of the roller **130**, thus removing residual toner from the developing roller **130** as will be described in detail later herein. The agitator **136** is installed inside toner tank **140** of developer **102** and circulates toner inside toner tank **140**. Agitator **136** also agitates new toner together with residual toner returned to tank **140** into position around both the developing and feeding rollers **130**, **132**, thus effectively mixing the new toner and the residual toner together within toner tank **140**. In such a case, the term "residual toner" generally designates the particles of toner that remains on the surface of developing roller **130** after each revolution of roller **130**, while the term "new toner" designates the toner that is newly applied onto the exterior circumferential surface of the developing roller **130** by toner feeding roller **132**.

In such a case, developing roller **130** is electrified with a negative bias developing voltage Vb, for example, about −300 V, thus having a negative developing potential on its surface. Meanwhile, toner feeding roller **132** is electrified with a negative bias voltage Vm, for example, about −500 V. A potential difference exists between the negative bias voltages applied onto the developing and toner feeding rollers **130** and **132**; the toner on the feeding roller **132** is frictionally electrified with a negative voltage and is moved onto the developing roller **130** by a developing force due to the significantly lower magnitude of the negative potential borne by the exterior circumferential surface of developing roller **130** relative to toner feeding roller **132**. The toner applied onto the exterior circumferential surface of the developing roller **130**, is regulated by the toner regulating blade **134**, to assure that the toner is applied with a uniform thickness. The toner on developing roller **130** is thereafter, moved and attached to the exposed circumferential area of photosensitive drum **100** due to static electricity formed by a potential difference between the potential the areas of the exposed image on the exterior circumference of drum **100** and the developing potential of the roller **130**, thus developing an image. These image development techniques in which the surface of the photosensitive drum **100** is brought into contact with the surface of the developing roller **130** for image development, is called contact-type developing technique. Specifically, when non-magnetic, polymerized toner is exclusively used in such a contact-type developing technique, the technique is called a contact-type, single component and non-magnetic developing technique.

In the operation of a laser beam printer, a sheet of paper is fed from paper cassette **106** by pick-up roller **108**, and is primarily lined up at its leading edge by roller **110** and roller **112** prior to being fed to the transfer roller **1 14** through the paper passage. After a lapse of time, the leading edge of the paper reaches the nip **36** between photosensitive drum **100** and transfer roller **114** at which time the step of transcription of the developed image onto the sheet of paper is performed. That is, when the photosensitive drum **100** is rotated farther after the exposure and development steps, thus reaching the transcription area, transcription is started. During

transcription, transfer roller **114** is electrified with a positive bias transfer voltage Vt of several hundred or several thousand kV, thereby causing a potential difference between the photosensitive drum **100** and the transfer roller **114** and generating static electricity within transcription area **37** (see FIG. **3**) between nip **34** and nip **36**. Due to the static electricity in the transcription area, the toner is transferred from the exterior circumferential surface of photosensitive drum **100** onto the surface of the sheet of paper, thus accomplishing the step of transcription. The sheet of paper, with the transferred toner, is, thereafter, pressurized and heated by pressure roller **118** and heat roller **120** of fixing unit **116** respectively. The toner is thus fixed onto the surface of the sheet of paper and produces an image on exposed surface of the sheet of paper. The sheet of paper discharged from fixing unit **116**, is distributed from paper outlet **80** of the printer. This sequence of electrification, exposure, development, transcription and fixation steps are sequentially performed until a printing process for each paper is completed.

During the operation of the printer, the toner on developing roller **130** is partially moved onto photosensitive drum **100** at positions corresponding to the exposed areas on the circumferential surface of photosensitive drum **100**. That is, the toner on developing roller **130** is only partially used at every revolution of developing roller **130**, while the remaining toner remains unused on the exterior circumferential surface of roller **130**. Developer **102** is designed however, to remove the residual toner from the surface of developing roller **130** by toner feeding roller **132** at the nip **38** between the two rollers **130** and **132** after each revolution of developing roller **130**. That is, the remaining toner is transferred from developing roller **130** onto toner feeding roller **132**, thus effectively cleaning developing roller **130** after each revolution. I have found that when developer **102** is used for a lengthy period of time, the expected operational function of toner feeding roller **132** may deteriorate due to the frictional abrasion of the roller's surface or the infiltration of toner into the foamed sponge forming the roller's surface. In such a case, the toner feeding roller **132** may fail to effectively remove such remaining toner from the developing roller **130**, allowing the remaining toner to be frictionally electrified again at the nip between the developing roller **130** and the feeding roller **132** prior to being reused in a continued development step. Therefore, the frictional electrification performance of the developer for the toner may be reduced and fail to accommodate uniformly distribution of the electrified bias voltage for each part of the developer, thus reducing image quality of processed papers.

FIG. **3** illustrates in a cross-sectional view, both the construction of a developer suitable for use in an image formation apparatus in accordance with the principles of the present invention and the electrical connections and polarities of bias voltages relative to a reference potential such as a local ground that are applied to the several parts of the developer. As shown in the drawing, the construction of the developer **32** of this embodiment may remain generally the same as in developer **102** illustrated in FIG. **2**, and may have the same size and exterior dimensions as developer **102**, thereby assuring backward compatibility with image formation apparatus designed to accommodate developer **102**. Therefore, the same components of developer **102** included in developer **32** in FIG. **3** are denoted by the same reference numerals and further explanation is not deemed necessary. Developer **32** is provided with both a reset roller **142** and a cleaning blade **144** that are positioned at locations around toner feeding roller **132** that are different from construction of a typical developer.

In developer **32**, toner feeding roller **132** is positioned inside toner tank **140** and is separated by orifice **42** from developing roller **130**. Toner feeding roller **132** is installed so as to be brought into contact with developing roller **130** and is used to frictionally electrify toner from toner tank **140** of developer **32** while uniformly applying the toner onto the surface of developing roller **130**. Toner feeding roller **132** also receives residual toner on its exterior circumferential surface from developing roller **130** on each revolution of developing roller **130** in order to remove the residual toner from developing roller **130**. On the other hand, reset roller **142** is installed at a location to contact the circumferential exterior surface of toner feeding roller **132** at a position that is approximately diametrically opposite to the exterior circumferential surface of developing roller **130** and is brought into contact with the exterior circumferential surface of toner feeding roller **132** with a nip **40** being formed between the exterior circumferential surfaces of toner feeding roller **132** and reset roller **142**. Reset roller **142**, which is at the nip **40** moving in a direction the same as the direction of travel of toner feeding roller **132**, that is, reset roller **142** which has the same direction of rotation as the direction rotation of toner feeding roller **132**, is used for removing the residual toner from toner feeding roller **132** after the residual toner has been moved from developing roller **130** onto feeding roller **132**.

During transcription, transfer roller **114** may be electrified with a positive bias transfer voltage Vt of several hundred or several thousand kV while the central axle of photosensitive drum **100** is maintained at a reference potential such as a local ground (i.e., a ground potential relative to the bias voltages of Vch, Vt and Vb), thereby causing a potential difference between the photosensitive drum **100** and the transfer roller, **114** and generating static electricity (e.g., with a potential difference relative to the local ground of approximately −800 volts) within transcription area **37** between nip **34** and nip **36**. Due to the static electricity in transcription area, the toner is transferred from the exterior circumferential surface of photosensitive drum **100** onto the surface of the sheet paper, thus accomplishing the step of transcription. Reset roller **142** may be electrified with a low level negative bias voltage Vr, for example, about −100 V, which is substantially lower than the absolute value of the magnitude of bias voltage Vm (e.g., approximately −500 volts) applied to the exterior circumferential surface of toner feeding roller **132**. Therefore, the remaining toner of feeding roller **132** is effectively moved onto reset roller **142** due to a potential difference between to rollers **132** and **142**, thus keeping feeding roller **132** clean. Cleaning blade **144** is positioned with the edge of blade **144** coming into direct contact with the exterior circumferential surface of reset roller **142**, thus removing the remaining particles of residual toner from reset roller **142**.

During the operation of developer **32**, residual toner borne by toner feeding roller **132** is almost completely moved onto reset roller **142** which is, in turn, continuously cleaned by the engagement of the tip of cleaning blade **144** directly against an axial length of the exterior circumferential surface of reset roller **142**. The circumferential surface of toner feeding roller **132** is thus always kept clean; consequently feeding roller **132** is enabled to effectively maintain its expected operational function, such as frictional electrification of toner at nip **38** between developing roller **130** and feeding roller **132**, and removal of residual toner from the exterior circumferential surface of developing roller **130**.

Therefore, even when the developer **102** is used for a lengthy period of time, toner feeding roller **132** is free from most frictional abrasion of the roller's exterior circumferential surface and from substantial infiltration of toner into the roller's sponge rubber surface, thus maintaining its expected operational function. Toner feeding roller **132** thus effectively removes remaining toner from the developing

roller **130** during the operation of image producing apparatus, thereby improving the frictional electrification performance of the developer **102** relative to the toner and uniformity of the electrified bias voltage on each part of the developer, all of which contribute to the overall improvement of image quality of papers printed by the apparatus.

As described above, the present invention provides a developer suitable for use with electrophotographic developing techniques incorporated into processes and apparatus while using contact-type, single component and non-magnetic toner to develop images by applying the non-magnetic toner onto electrostatic latent images that have been formed on the exterior circumferential surface of a photosensitive drum. The developer constructed according to the principles of this invention almost completely retard deterioration of the expected operational function of the toner feeding roller even after the developer has used for a lengthy period of time, thus effectively preventing any reduction in the quality of images printed by the apparatus during the process onto paper by minimizing deterioration of operational function of the toner feeding roller.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A developer for an image producing apparatus, utilizing an electrophotographic developing technology capable of developing an image by applying non-magnetic toner from a developing roller to an electrostatic latent image on a photosensitive drum, comprising:

a toner feeding roller positioned around said developing roller to be brought into contact with the developing roller, said toner feeding roller frictionally electrifying the toner so as to apply the toner to the surface of the developing roller, and cleaning the developing roller by receiving residual toner from the developing roller during revolution of said developing roller;

a reset roller positioned around said toner feeding roller and brought into contact with the toner feeding roller, said reset roller cleaning the toner feeding roller by receiving the residual toner from said toner feeding roller;

a cleaning blade positioned with an edge in contact with the surface of said reset roller, to remove the residual toner from said reset roller;

a first terminal for applying to said toner feeding roller an electrical potential exhibiting a first absolute magnitude; and

a second terminal for applying to said reset roller an electrical potential exhibiting a second absolute magnitude, wherein said second absolute magnitude is less than said first absolute magnitude.

2. The developer of claim **1**, wherein said reset roller and said toner feeding roller rotate in the same direction.

3. The developer of claim **1**, further comprised of:

a third terminal for applying to said developing roller an electrical potential exhibiting a third absolute magnitude, wherein said third absolute magnitude is greater than said second absolute magnitude and less than said first absolute magnitude.

4. A developer for an image producing apparatus, utilizing an electrophotographic developing technology capable of developing an image by applying non-magnetic toner from a developing roller to an electrostatic latent image on a photosensitive drum, comprising:

a toner feeding roller positioned around said developing roller so as to be brought into contact with the developing roller, said toner feeding roller being adapted for frictionally electrif ying toner with a negative bias voltage so as to apply the toner to the surface of the developing roller, and getting remaining toner from the surface of the developing roller at every revolution of said developing roller so as to clean the developing roller;

a reset roller positioned around said toner feeding roller so as to be brought into contact with the toner feeding roller, said reset roller being electrified with a low level negative bias voltage which is less than the negative bias voltage of the toner feeding roller, thus getting the remaining toner from the surface of the toner feeding roller due to a potential difference between the toner feeding roller and said reset roller and thereby cleaning the toner feeding roller; and

a cleaning blade positioned with an edge in contact with the surface of said reset roller, to remove the remaining toner from said reset roller.

5. The developer according to claim **4**, wherein said reset roller and said toner feeding roller rotate in the same direction.

6. The developer of claim **4**, further comprised of:

a first terminal for applying to said developing roller an electrical potential exhibiting a first absolute magnitude;

a second terminal for applying to said toner feeding roller an electrical potential exhibiting a second absolute magnitude, wherein said second absolute magnitude is greater than said first absolute magnitude; and

a third terminal for applying to said reset roller an electrical potential exhibiting a third absolute magnitude, wherein said third absolute magnitude is less than said first absolute magnitude, and wherein said third absolute magnitude is less than said second absolute magnitude.

7. An electrostatic developer, comprising:

a tank having an orifice oriented to discharge non-magnetic toner;

a developing roller having an exterior circumferential surface positioned within said orifice to transport the non-magnetic toner emanating from said tank onto an exterior circumferential surface of a photosensitive drum bearing an electrostatic latent image;

a toner feeding roller positioned inside said tank and separated from said developing roller by said orifice, said toner feeding roller having an exterior circumferential surface positioned to make tangential contact with said developing roller, said toner feeding roller frictionally electrifying the non-magnetic toner so as to apply the non-magnetic toner to said exterior circumferential surface of said developing roller, and receiving residual toner from said developing roller during revolution of said developing roller;

a reset roller separated from said developing roller by said toner feeding roller, said reset roller having an exterior circumferential surface positioned to make tangential contact with said toner feeding roller and to convey the residual toner from said toner feeding roller;

a cleaning blade positioned inside said tank with an edge in contact with said exterior circumferential surface of said reset roller to remove the residual toner from said reset roller;

a first terminal applying to said toner feeding roller an electrical potential exhibiting a first absolute magnitude: and

a second terminal applying to said reset roller an electrical potential exhibiting a second absolute magnitude, wherein said second absolute magnitude is greater than said first absolute magnitude.

8. The electrostatic developer of claim **7**, further comprised of said reset roller rotating in a direction identical to said toner feeding roller.

9. The electrostatic developer of claim **7**, further comprised of an agitator rotatably mounted within said tank and spaced apart from said reset roller.

10. The electrostatic developer of claim **7**, further comprised of:

a third terminal for applying to said developing roller an electrical potential exhibiting a third absolute magnitude, wherein said third absolute magnitude is greater than said second absolute magnitude and less than said first absolute magnitude.

11. The electrostatic developer of claim **7**, further comprised of said toner feeding roller rotating in a direction the same as said developing roller.

12. The electrostatic developer of claim **7**, further comprised of:

said toner feeding roller rotating in a direction the same as said developing roller; and

said reset roller rotating in a direction the same as said toner feeding roller.

13. An electrophotographic developer, comprising:

a photosensitive drum rotating in a first direction;

a developing roller in contact with said photosensitive drum, said developing roller rotating in a second and opposite direction to said photosensitive drum;

a toner feeder roller placed in contact with said developing roller and in a location diametrically opposite from said photosensitive drum, said toner feeder roller rotating in said second direction; and

a reset roller placed in contact with said toner feeder roller, said reset roller positioned in a location diametrically opposite from said developing roller, said reset roller rotating in said second direction being.

14. The electrophotographic developer of claim **13**, further comprising a cleaning blade with an edge in contact with the surface of said reset roller, to remove remaining toner from said reset roller.

15. The electrophotographic developer of claim **13**, further comprising a tank having an orifice oriented to discharge non-magnetic toner.

16. The electrophotographic developer of claim **13**, wherein said developing roller, said toner feeder roller, and said reset roller each have a separate voltage applied thereto.

17. A method for cleaning residual toner from a developing roller in an electrophotographic apparatus, comprising the steps of:

rotating a toner feeder roller in the same direction as said developing roller, said toner feeder roller being in contact with said developing roller, said developing roller having a first voltage having a first magnitude, said toner feeder roller having a second voltage having a second magnitude which is greater than the first magnitude of the first voltage applied to said developing roller, said toner feeder roller removing residual toner from said developing roller; and

rotating a reset roller in the same direction as said developing roller and said toner feeder roller, said reset roller being in contact with said toner feeder roller at a location on said toner feeder roller that is diametrically opposite to a point of contact between said developing roller and said toner feeder roller, said reset roller having a third voltage having a third magnitude which is less than the first magnitude of the first voltage applied to said developing roller, said reset roller removing the residual toner from said toner feeder roller.

18. The method of claim **17**, further comprising the step of scraping off residual toner on said reset roller by having a cleaning blade positioned with an edge in contact with the surface of said reset roller, to remove the residual toner from said reset roller.

19. A developer for an image producing apparatus, utilizing an electrophotographic developing technology capable of developing an image by applying non-magnetic toner from a developing roller to an electrostatic latent image on a photosensitive drum, comprising:

a toner feeding roller positioned around said developing roller to be brought into contact with the developing roller and forming a nip, said nip frictionally electrifying the toner so that the toner is applied to the surface of the developing roller, and cleaning the developing roller by receiving residual toner from the developing roller during revolution of said developing roller;

a reset roller positioned around said toner feeding roller and brought into contact with the toner feeding roller, said reset roller cleaning the toner feeding roller by receiving the residual toner from said toner feeding roller;

a cleaning blade positioned with an edge in contact with the surface of said reset roller, to remove the remaining toner from said reset roller;

a first terminal for applying to said toner feeding roller an electrical potential exhibiting a first absolute magnitude; and

a second terminal for applying to said reset roller an electrical potential exhibiting a second absolute magnitude, wherein said second absolute magnitude is less than said first absolute magnitude.

20. The developer of claim **19**, further comprised of:

a third terminal for applying to said developing roller an electrical potential exhibiting a third absolute magnitude, wherein said third absolute magnitude is greater than said second absolute magnitude and less than said first absolute magnitude.

21. The developer of claim **19**, wherein said reset roller and said toner feeding roller rotate in the same direction.

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